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CLAIMS

(57) [Claim(s)]

[Claim 1] The maintaining-a-discharge electrode pair to which at least one of the two which counters through discharge-in-gases space generates maintenance discharge on the substrate of a transparent pair, In the panel configuration for color displays of 3 electrode-surface discharge mold equipped with the write-in electrode which counters with this maintaining-a-discharge electrode pair, and generates write-in discharge While preparing the fluorescent substance film which emits light by discharge between said maintaining-a-discharge electrode pairs on the substrate of said another side which arranges said maintaining-a-discharge electrode pair on the substrate of while it is said transparency located in an observation side side, and is located in a tooth-back side While extending and arranging said write-in electrode in the bottom of the fluorescent substance film and constituting said maintaining-a-discharge electrode pair from transparency electric conduction film the electrode drawer which met some transparency electric conduction film at the longitudinal direction -- public funds -- the discharge-in-gases panel characterized by preparing a group ingredient layer and enabling it to observe luminescence of said fluorescent substance film through a maintaining-a-discharge electrode pair and a transparency substrate, respectively.

[Claim 2] Said metallic material layer for electrode drawers is a discharge-in-gases panel according to claim 1 characterized by being prepared in the electrode side edge section which is distant from the field discharge gap of a maintaining-a-discharge electrode pair. [Claim 3] The transparency electric conduction film which constitutes said maintaining-a-discharge electrode pair is a discharge-in-gases panel according to claim 1 or 2 characterized by having mutually the height which carries out contiguity opposite, and a maintaining-a-discharge cel being constituted by the height which carries out contiguity opposite.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the discharge-in-gases panel used for a display unit etc., especially the discharge-in-gases panel for color displays which combined the fluophor. As a discharge-in-gases panel which displays an alphabetic character and a graphic form using discharge-in-gases light, the thing of the opposite discharge mold and field discharge mold of AC drive form or DC drive form is put in practical use. Moreover, the discharge-in-gases panel which excites a fluophor for a fluorescent substance by combination and the ultraviolet rays at the time of discharge on these discharge-in-gases panels, and performs a necessary color luminescence display is also already proposed.

[0002] Although the discharge-in-gases panel of the viewpoint which prevents degradation by the ion bombardment of the structure top fluorescent substance as a discharge-in-gases panel for color displays combined with such a fluorescent substance to a field discharge mold is advantageous, in order to perform color display using luminescence from the front face of the fluophor film, brightness is low and there is an inclination for a clear color display image not to be obtained. For this reason, the panel structure where a clear color display image is obtained by high brightness is needed.

[0003]

[Description of the Prior Art] The field discharge mold discharge-in-gases panel for the conventional color displays is shown in drawing 2. The maintaining-a-discharge electrodes 12 and 13 which consist of 3 layer structures of Cr-Cu-Cr of a lengthwise direction which has the ctenidium lobes 12a and 13a which this discharge-in-gases panel adjoins, respectively on one glass substrate 11 of the bottom which functions as an electrode support substrate, and make a pair are formed, and the maintaining-a-discharge cel Sc which generates field discharge (maintenance discharge) mutually by the ctenidium lobes 12a and 13a which carry out contiguity opposite is constituted.

[0004] moreover, these parallel maintaining-a-discharge electrode pair -- the lateral write-in electrode (address electrode) 15 and charge **** 16 for wall charge interference prevention are arranged through the insulator layers 14, such as low melting glass, on 12 and 13. The write-in discharge cel Wc is constituted by the intersection section of the electrode 15 write-in [these] and either of the maintenance discharge electrode pairs (in the case of illustration 12). And the surface thin film (protective coat) which consists of a magnesium oxide (MgO) which is not illustrated on this write-in electrode 15 and charge **** 16 is given.

[0005] moreover -- the inside of the glass substrate 21 of another side of the bottom for covering which counters this electrode support substrate 11 -- said maintaining-a-discharge electrode pair -- the cel layer 22 of the shape of a mesh which demarcates the maintaining-a-discharge cel which becomes settled between 12 or 13 ctenidium height 12a and 13a is arranged, and the fluophor film 23 for color displays is put in the partition surrounded in that cel layer 22. Thus, the perimeter is closed airtightly, and the gas for discharge is enclosed with the discharge space, and a discharge-in-gases panel completes said electrode support substrate 11 and the substrate 21 for covering which were formed.

[0006] And after making the write-in selected discharge cel Wc generate write-in discharge, color display makes this discharge take over to the adjoining maintenance discharge cel Sc, and the corresponding fluophor film 23 is partially excited by the ultraviolet rays by that maintenance discharge, and it can observe a color luminescence display through the 21st page of the substrate for covering by them. In this case, since the opaque maintaining-a-discharge electrode pair and the write-in electrode are prepared in the electrode support substrate 11, it is unsuitable to observe a display through the electrode support substrate concerned.

[0007]

[Problem(s) to be Solved by the Invention] By the above-mentioned conventional discharge-in-gases panel for color displays, since the substrate 21 side for covering on which the fluophor film 23 was put is an image observation (vision) side, brightness falls by attenuation in case luminescence by this fluophor film 23 penetrates the fluorescent substance film concerned, and luminous efficiency worsens. Moreover, there was a problem that a clear color display image -- brightness unevenness arises from the difference of the transmission loss by the ununiformity of the thickness of the fluophor film 23 -- was not obtained.

[0008] This invention aims at offering the new discharge-in-gases panel for a color luminescence display which canceled the brightness unevenness resulting from decline in the brightness by the fluophor film, and luminous efficiency, or the thickness of the fluophor film from the above-mentioned conventional situation.

[0009]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, while the substrate of another side which arranges the fluorescent substance film for the substrate of while it is the transparence which arranges a maintaining-a-discharge electrode pair a front-face (vision) side is made into a tooth-back side and the transparence electric conduction film constitutes said maintaining-a-discharge electrode pair from this invention the electrode drawer which met these some transparence electric conduction film at the longitudinal direction -- public funds -- the group ingredient layer was prepared and the configuration which made the write-in electrode extend under the fluorescent substance film of the above-mentioned tooth-back side substrate further is adopted.

[0010] Thus, by making into a display observation side the substrate with which the transparent maintaining-a-discharge electrode pair was arranged, further, the direct-vision private seal of the excitation luminescence of the fluorescent substance film of the tooth-back side substrate side at the time of discharge by the electrode pair can be carried out through the transparence maintaining-a-discharge electrode pair concerned and a transparence substrate, and since there is no write-in electrode in a luminescence path, luminous efficiency and its brightness improve, and clear color display can be realized. Moreover, although there is un-arranging [which becomes easy to disconnect by the heat cycle at the time of electrode formation] while electrode resistance becomes high when said maintaining-a-discharge electrode is formed by transparence electric conduction film, such as ITO (Indium Tin Oxide) the electrode drawer connected to these some transparence electric conduction film -- public funds -- these problems are solved by the group ingredient layer, and if this metallic material layer is prepared in the electrode side edge section which is distant from the field discharge gap of a maintaining-a-discharge electrode pair, the problem which interrupts display light can also be suppressed.

[0011]

[Embodiment of the Invention] Hereafter, the desirable example of this invention is explained to a detail using a drawing. Drawing 1 is the important section sectional view showing an example configuration of the discharge-in-gases panel by this invention, and gives the same sign to the conventional example and equivalent part of drawing 2. The 1st point that the example of this invention shown in this drawing 1 differs from the conventional example of drawing 2 The electrode support substrate 11 consists of a transparent glass substrate arranged at a vision side. It consists of transparence electric conduction film in which two or more sets maintaining-a-discharge electrode pairs 31i arranged on it and 32j (i and j are a positive integer) formed ITO etc. by thin film formation technique. The insulator layer 14 which carries out a laminating on it is formed from transparent dielectric materials (for example, low melting glass). It is having short-circuited like illustration between the maintaining-a-discharge electrodes of one of the two which furthermore adjoins the transparent each maintaining-a-discharge electrode pair 31i and both 32j, 321 and 312 [for example,], by the metallic material layer 33 of thick films, such as gold (Au).

[0012] This metallic material layer 33 has the function which lowers the resistance of two electrodes, and the restoration function of the open circuit which originated in the heat cycle at the time of electrode formation, and was produced while being an electrode outgoing line to the external drive circuit of two maintaining-a-discharge electrodes 321, 312 short-circuited (connection). Moreover, since the metallic material layer 33 in this case is in the location which does not interrupt display light substantially between the maintaining-a-discharge electrode pairs which adjoin by the relation which overlaps the side edge of each maintaining-a-discharge electrode as shown in drawing, it has the function which covers between the maintaining-a-discharge cels which adjoined rather as well as there being little effect on brightness, and forms a sharp display spot. [0013] An insulator layer 14 and the surface thin films 17, such as MgO, are given as usual on the array of a maintaining-a-discharge electrode pair formed as mentioned above on the other hand, and opposite arrangement is carried out with the glass substrate 21 of another side which separates discharge-in-gases space and is located in a tooth-back side. The 2nd point that the discharge-in-gases panel of this invention differs from the discharge-in-gases panel which performs write-in discharge in the conventional field discharge format is in the point of having formed the write-in electrode 15 in the glass substrate 21 by the side of a tooth back in the form made extending under the fluorescent substance film 23 like drawing 1. While arranging the write-in electrode 15 of the direction which intersects maintaining-a-discharge electrode pair 31i on the above-mentioned electrode support substrate 11, and 32j on the glass substrate 21 by the side of a tooth back, the insulator layer 41 which becomes the write-in electrode 15 from dielectric materials is covered, and the fluorescent substance film 23 is formed on this insulator layer 41.

[0014] Moreover, by this panel, in order to demarcate a unit discharge cel more certainly, the cel layers 22 and 42 are formed in the glass substrates 11 and 21 of both sides, and form the write-in discharge cel and maintaining-a-discharge cel which serve as a pair, respectively in single discharge-in-gases space. Therefore, in the discharge-in-gases panel of the example shown in this drawing 1, since color display light can carry out direct observation through the transparent maintaining-a-discharge electrode pair by the side of vision, and a glass substrate 11, it is high brightness and clear color display can be appeared. And since the write-in electrode 15 is under the fluorescent substance film and color display light is not interrupted at all, brightness and visibility higher than the conventional discharge-in-gases panel

shown in drawing 2 can be acquired.

[0015]

[Effect of the Invention] Since direct observation of the color luminescence by excitation of the fluophor film is carried out through the respectively transparent maintaining-a-discharge electrode pair by the side of opposite (vision side), and a substrate according to the discharge-in-gases panel structure of this invention, without letting the inside of this fluophor film pass There are also no problems which luminous efficiency and brightness improve, and the clear color display of becomes possible, and originate in a transparent maintaining-a-discharge electrode (transparence electric conduction film), such as high electrode resistance and an open circuit, it applies to color display equipment, and the effectiveness is large.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the discharge-in-gases panel used for a display unit etc., especially the discharge-in-gases panel for color displays which combined the fluophor. As a discharge-in-gases panel which displays an alphabetic character and a graphic form using discharge-in-gases light, the thing of the opposite discharge mold and field discharge mold of AC drive form or DC drive form is put in practical use. Moreover, the discharge-in-gases panel which excites a fluophor for a fluorescent substance by combination and the ultraviolet rays at the time of discharge on these discharge-in-gases panels, and performs a necessary color luminescence display is also already proposed.

[0002] Although the discharge-in-gases panel of the viewpoint which prevents degradation by the ion bombardment of the structure top fluorescent substance as a discharge-in-gases panel for color displays combined with such a fluorescent substance to a field discharge mold is advantageous, in order to perform color display using luminescence from the front face of the fluophor film, brightness is low and there is an inclination for a clear color display image not to be obtained. For this reason, the panel structure where a clear color display image is obtained by high brightness is needed.

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PRIOR ART

[Description of the Prior Art] The field discharge mold discharge-in-gases panel for the conventional color displays is shown in drawing 2. The maintaining-a-discharge electrodes 12 and 13 which consist of 3 layer structures of Cr-Cu-Cr of a lengthwise direction which has the ctenidium lobes 12a and 13a which this discharge-in-gases panel adjoins, respectively on one glass substrate 11 of the bottom which functions as an electrode support substrate, and make a pair are formed, and the maintaining-a-discharge cel Sc which generates field discharge (maintenance discharge) mutually by the ctenidium lobes 12a and 13a which carry out contiguity opposite is constituted.

[0004] moreover, these parallel maintaining-a-discharge electrode pair -- the lateral write-in electrode (address electrode) 15 and charge **** 16 for wall charge interference prevention are arranged through the insulator layers 14, such as low melting glass, on 12 and 13. The write-in discharge cel Wc is constituted by the intersection section of the electrode 15 write-in [these] and either of the maintenance discharge electrode pairs (in the case of illustration 12). And the surface thin film (protective coat) which consists of a magnesium oxide (MgO) which is not illustrated on this write-in electrode 15 and charge **** 16 is given.

[0005] moreover -- the inside of the glass substrate 21 of another side of the bottom for covering which counters this electrode support substrate 11 -- said maintaining-a-discharge electrode pair -- the cel layer 22 of the shape of a mesh which demarcates the maintaining-a-discharge cel which becomes settled between 12 or 13 ctenidium height 12a and 13a is arranged, and the fluophor film 23 for color displays is put in the partition surrounded in that cel layer 22. Thus, the perimeter is closed airtightly, and the gas for discharge is enclosed with the discharge space, and a discharge-in-gases panel completes said electrode support substrate 11 and the substrate 21 for covering which were formed.

[0006] And after making the write-in selected discharge cel Wc generate write-in discharge, color display makes this discharge take over to the adjoining maintenance discharge cel Sc, and the corresponding fluophor film 23 is partially excited by the ultraviolet rays by that maintenance discharge, and it can observe a color luminescence display through the 21st page of the substrate for covering by them. In this case, since the opaque maintaining-a-discharge electrode pair and the write-in electrode are prepared in the electrode support substrate 11, it is unsuitable to observe a display through the electrode support substrate concerned.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since direct observation of the color luminescence by excitation of the fluophor film is carried out through the respectively transparent maintaining-a-discharge electrode pair by the side of opposite (vision side), and a substrate according to the discharge-in-gases panel structure of this invention, without letting the inside of this fluophor film pass, There are also no problems which luminous efficiency and brightness improve, and the clear color display of becomes possible, and originate in a transparent maintaining-a-discharge electrode (transparence electric conduction film), such as high electrode resistance and an open circuit, it applies to color display equipment, and the effectiveness is large.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the above-mentioned conventional discharge-in-gases panel for color displays, since the substrate 21 side for covering on which the fluophor film 23 was put is an image observation (vision) side, brightness falls by attenuation in case luminescence by this fluophor film 23 penetrates the fluorescent substance film concerned, and luminous efficiency worsens. Moreover, there was a problem that a clear color display image -- brightness unevenness arises from the difference of the transmission loss by the ununiformity of the thickness of the fluophor film 23 -- was not obtained.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, while the substrate of another side which arranges the fluorescent substance film for the substrate of while it is the transparence which arranges a maintaining-a-discharge electrode pair a front-face (vision) side is made into a tooth-back side and the transparence electric conduction film constitutes said maintaining-a-discharge electrode pair from this invention the electrode drawer which met these some transparence electric conduction film at the longitudinal direction -- public funds -- the group ingredient layer was prepared and the configuration which made the write-in electrode extend under the fluorescent substance film of the above-mentioned tooth-back side substrate further is adopted.

[0010] Thus, by making into a display observation side the substrate with which the transparent maintaining-a-discharge electrode pair was arranged, further, the direct-vision private seal of the excitation luminescence of the fluorescent substance film of the tooth-back side substrate side at the time of discharge by the electrode pair can be carried out through the transparence maintaining-a-discharge electrode pair concerned and a transparence substrate, and since there is no write-in electrode in a luminescence path, luminous efficiency and its brightness improve, and clear color display can be realized. Moreover, although there is un-arranging [which becomes easy to disconnect by the heat cycle at the time of electrode formation] while electrode resistance becomes high when said maintaining-a-discharge electrode is formed by transparence electric conduction film, such as ITO (Indium Tin Oxide) the electrode drawer connected to these some transparence electric conduction film -- public funds -- these problems are solved by the group ingredient layer, and if this metallic material layer is prepared in the electrode side edge section which is distant from the field discharge gap of a maintaining-a-discharge electrode pair, the problem which interrupts display light can also be suppressed.

[0011]

[Embodiment of the Invention] Hereafter, the desirable example of this invention is explained to a detail using a drawing. Drawing 1 is the important section sectional view showing an example configuration of the discharge-in-gases panel by this invention, and gives the same sign to the conventional example and equivalent part of drawing 2. The 1st point that the example of this invention shown in this drawing 1 differs from the conventional example of drawing 2 The electrode support substrate 11 consists of a transparent glass substrate arranged at a vision side. It consists of transparence electric conduction film in which two or more sets maintaining-a-discharge electrode pairs 31i arranged on it and 32j (i and j are a positive integer) formed ITO etc. by thin film formation technique. The insulator layer 14 which carries out a laminating on it is formed from transparent dielectric materials (for example, low melting glass). It is having short-circuited like illustration between the maintaining-a-discharge electrodes of one of the two which furthermore adjoins the transparent each maintaining-a-discharge electrode pair 31i and both 32j, 321 and 312 [for example,], by the metallic material layer 33 of thick films, such as gold (Au).

[0012] This metallic material layer 33 has the function which lowers the resistance of two electrodes, and the restoration function of the open circuit which originated in the heat cycle at the time of electrode formation, and was produced while being an electrode outgoing line to the external drive circuit of two maintaining-a-discharge electrodes 321, 312 short-circuited (connection). Moreover, since the metallic material layer 33 in this case is in the location which does not interrupt display light substantially between the maintaining-a-discharge electrode pairs which adjoin by the relation which overlaps the side edge of each maintaining-a-discharge electrode as shown in drawing, it has the function which covers between the maintaining-a-discharge cels which adjoined rather as well as there being little effect on brightness, and forms a sharp display spot. [0013] An insulator layer 14 and the surface thin films 17, such as MgO, are given as usual on the array of a maintaining-a-discharge electrode pair formed as mentioned above on the other hand, and opposite arrangement is carried out with the glass substrate 21 of another side which separates discharge-in-gases space and is located in a tooth-back side. The 2nd point that the discharge-in-gases panel of this invention differs from the discharge-in-gases panel which performs write-in discharge in the conventional field discharge format is in the point of having formed the write-in electrode 15 in the glass substrate 21 by the side of a tooth back in the form made extending under the fluorescent substance film 23 like drawing 1. While arranging the write-in electrode 15 of the direction which intersects maintaining-a-discharge electrode pair 31i on the above-mentioned electrode support substrate 11, and 32j on

the glass substrate 21 by the side of a tooth back, the insulator layer 41 which becomes the write-in electrode 15 from dielectric materials is covered, and the fluorescent substance film 23 is formed on this insulator layer 41.

[0014] Moreover, by this panel, in order to demarcate a unit discharge cell more certainly, the cell layers 22 and 42 are formed in the glass substrates 11 and 21 of both sides, and form the write-in discharge cell and maintaining-a-discharge cell which serve as a pair, respectively in single discharge-in-gases space. Therefore, in the discharge-in-gases panel of the example shown in this drawing 1, since color display light can carry out direct observation through the transparent maintaining-a-discharge electrode pair by the side of vision, and a glass substrate 11, it is high brightness and clear color display can be appeared. And since the write-in electrode 15 is under the fluorescent substance film and color display light is not interrupted at all, brightness and visibility higher than the conventional discharge-in-gases panel shown in drawing 2 can be acquired.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the important section sectional view of the discharge-in-gases panel which applied this invention.

[Drawing 2] It is an important section decomposition perspective view for explaining the field discharge mold discharge-in-gases panel for the conventional color displays.

[Description of Notations]

11 is a glass substrate by the side of a front face (vision).

14 and 41 are an insulator layer.

15 is a write-in electrode.

21 is a glass substrate by the side of a tooth back.

22 and 42 are a cel layer.

23 is the fluophor film.

31i and 32j are a maintaining-a-discharge electrode (transparence electric conduction film).

33 is a metallic material layer for electrode drawers.

[Translation done.]

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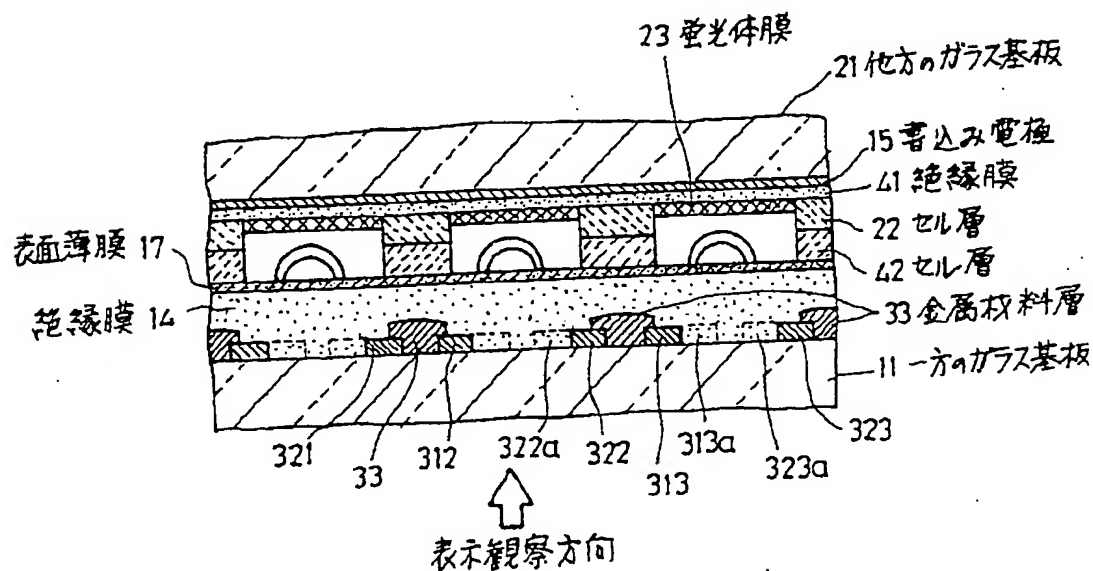
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DRAWINGS

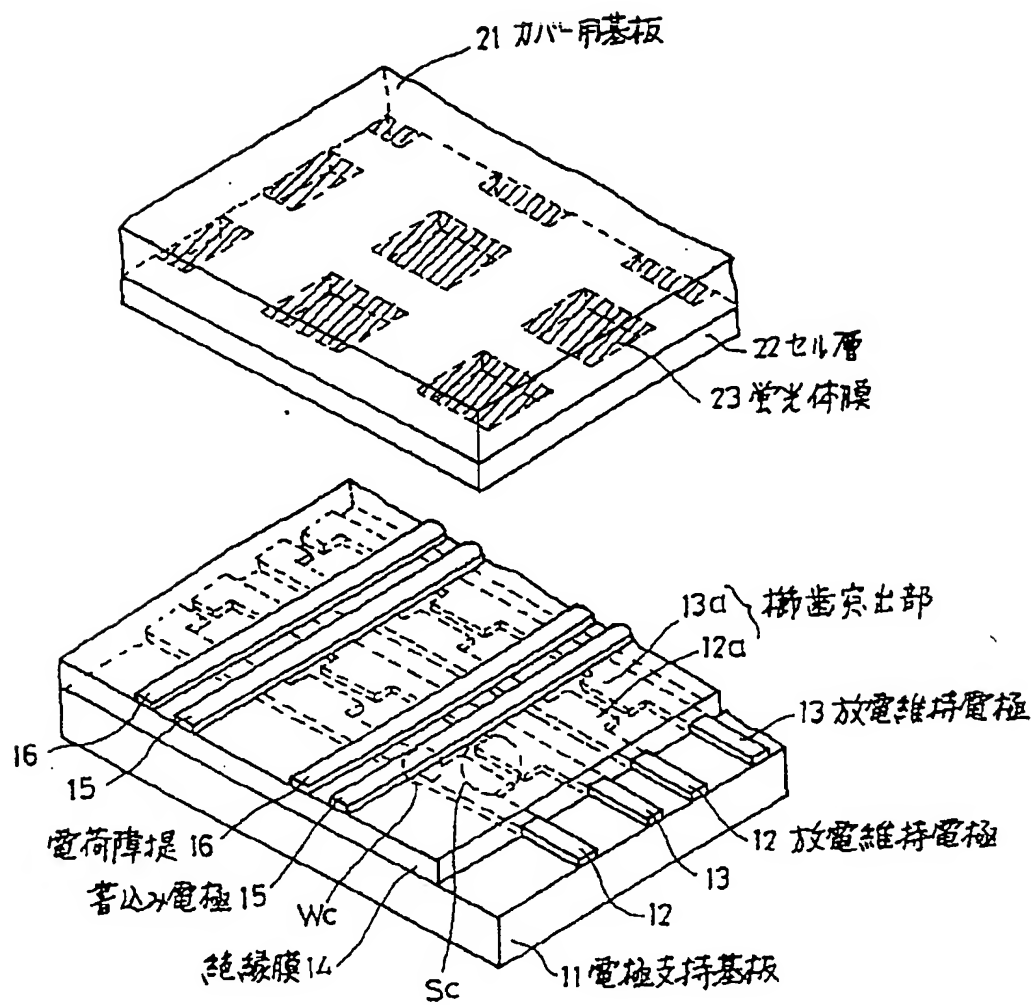
[Drawing 1]

本発明を適用したガス放電パネルの要部断面図



[Drawing 2]

従来のガス放電パネルを説明する要部分解斜視図



[Translation done.]